

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Exam: Function Reflections (Solution version 39)**

1. Let function  $f$  be defined by the polynomial below:

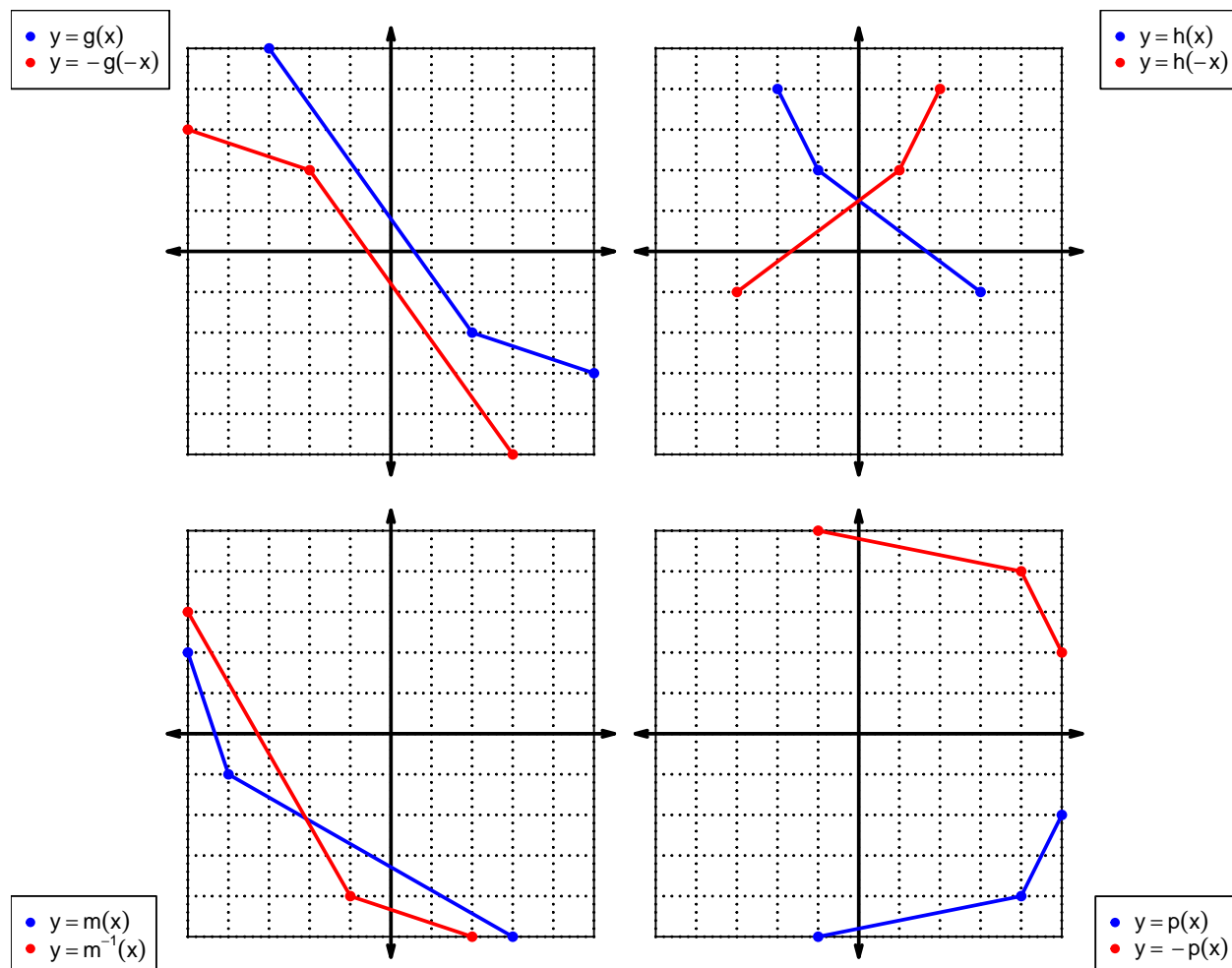
$$f(x) = 4x^4 + 3x^3 + 6x^2 - 5x + 2$$

Draw lines that match each function reflection with its polynomial:

**Reflections****Polynomials**

$-f(x)$	●	●	$-4x^4 + 3x^3 - 6x^2 - 5x - 2$
$-f(-x)$	●	●	$-4x^4 - 3x^3 - 6x^2 + 5x - 2$
$f(-x)$	●	●	$4x^4 - 3x^3 + 6x^2 + 5x + 2$

2. In each  $xy$  plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The  $x$  axis is horizontal and the  $y$  axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions  $f$ ,  $g$ , and  $h$  are defined by the table below.

$x$	$f(x)$	$g(x)$	$h(x)$
1	2	8	3
2	6	7	8
3	3	4	9
4	8	1	7
5	4	2	6
6	1	9	1
7	5	6	2
8	9	3	5
9	7	5	4

3. Evaluate  $h(5)$ .

$$h(5) = 6$$

4. Evaluate  $f^{-1}(2)$ .

$$f^{-1}(2) = 1$$

5. Assuming  $h$  is an **odd** function, evaluate  $h(-4)$ .

If function  $h$  is odd, then

$$h(-4) = -7$$

6. Assuming  $g$  is an **even** function, evaluate  $g(-9)$ .

If function  $g$  is even, then

$$g(-9) = 5$$

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7. A function,  $f$ , is **even** if  $f(x) = f(-x)$  for all  $x$  in the domain. A function,  $g$ , is **odd** if  $g(x) = -g(-x)$  for all  $x$  in the domain.

Let polynomial  $p$  be defined with the following equation:

$$p(x) = -x^3 + x$$

- a. Express  $p(-x)$  as a polynomial in standard form.

$$p(-x) = -(-x)^3 + (-x)$$

$$p(-x) = x^3 - x$$

- b. Express  $-p(-x)$  as a polynomial in standard form.

$$-p(-x) = -(x^3 - x)$$

$$-p(-x) = -x^3 + x$$

- c. Is polynomial  $p$  even, odd, or neither?

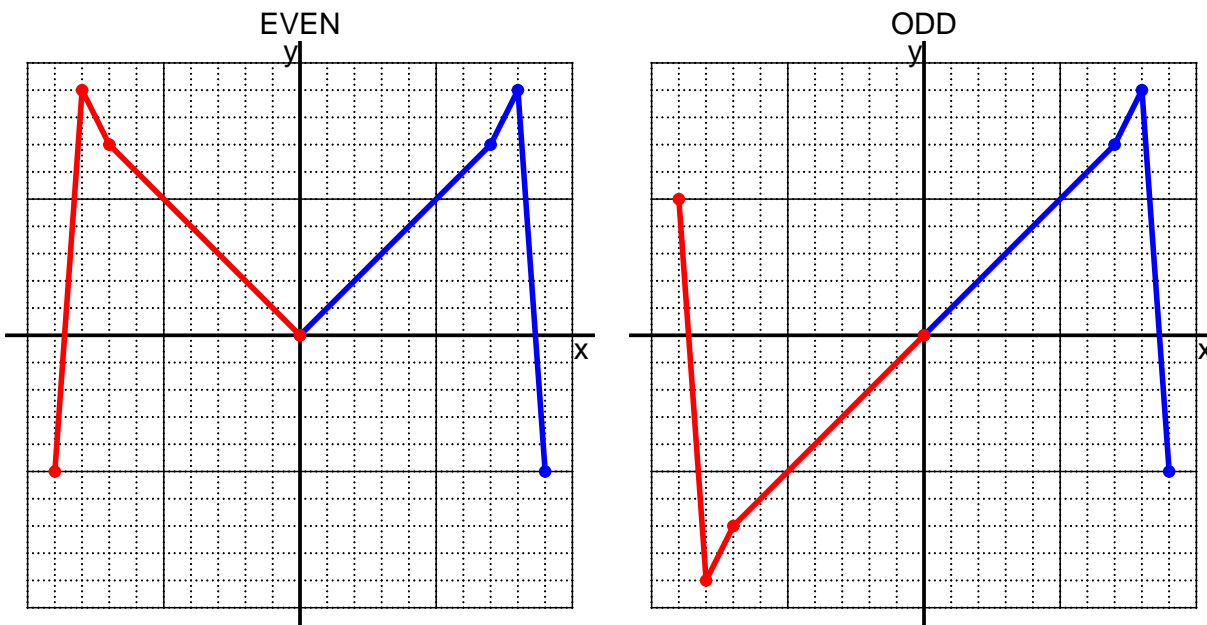
odd

- d. Explain how you know the answer to part c.

We see that  $p(x) = -p(-x)$  for all  $x$  because  $p(x)$  and  $-p(-x)$  are equivalent polynomials. Thus function  $p$  satisfies the criterion for being an odd function.

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8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function  $f$  be defined with the equation below.

$$f(x) = 8x - 6$$

a. Evaluate  $f(5)$ .

step 1: multiply by 8  
step 2: subtract 6

$$f(5) = 8(5) - 6$$

$$f(5) = 34$$

b. Evaluate  $f^{-1}(18)$ .

step 1: add 6  
step 2: divide by 8

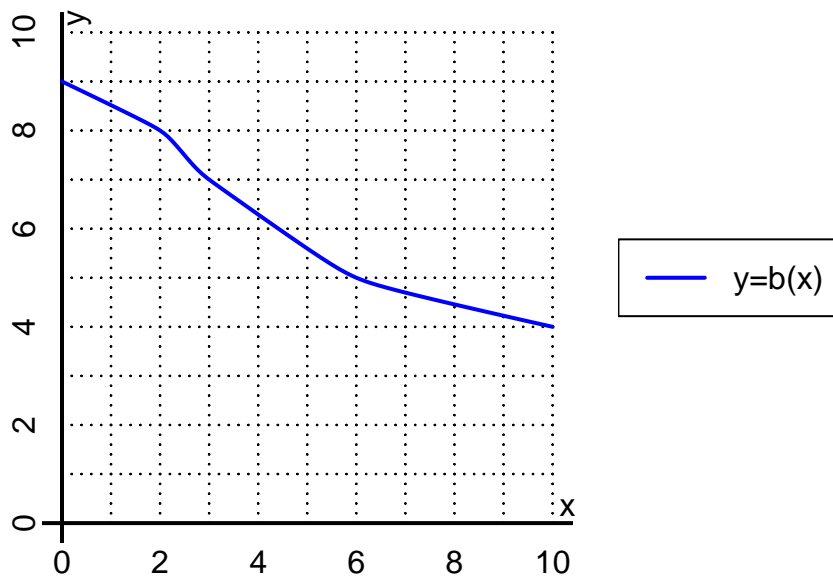
$$f^{-1}(x) = \frac{x + 6}{8}$$

$$f^{-1}(18) = \frac{(18) + 6}{8}$$

$$f^{-1}(18) = 3$$

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10. The function  $b$  is represented by the curve  $y = b(x)$  graphed below.



a. Evaluate  $b(6)$ .

$$b(6) = 5$$

b. Evaluate  $b^{-1}(8)$ .

$$b^{-1}(8) = 2$$

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11. Function  $f$  is defined by the table below.

a. Complete the columns for  $-f(x)$  and  $f(-x)$  and  $-f(-x)$ .

$x$	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-8	8	8	-8
-1	-3	3	-3	3
0	0	0	0	0
1	-3	3	-3	3
2	8	-8	-8	8

b. Is function  $f$  even, odd, or neither?

neither

c. How do you know the answer to part b?

Function  $f$  is neither because neither column  $-f(-x)$  nor column  $f(-x)$  matches column  $f(x)$  exactly.